## AMENDMENTS TO THE CLAIMS

The following listing of claims replaces all prior listings, and all prior versions, of claims in the application.

## LISTING OF CLAIMS:

1. (Currently Amended) A method for producing a digital topographic map, comprising the steps of:

dividing a basic map, produced through a UTM drawing method, into irregular grid-like sectors at a predetermined distance;

further dividing each irregular grid-like sector obtained to thereby produce irregular small sectors;

interpolating discontinuous data between each irregular grid-like sector and between each of the irregular small sectors;

producing digital data by using an algorithm to relate x,y coordinates of the irregular small sectors to elevation levels obtained through measurementfrom the UTM drawing method;

connecting the irregular small sectors at a common elevation with a straight line, thereby producing a first topographic map, on which contour lines are formed with line segments; and

conducting a smoothing process on the contour lines of said first topographic map to produce a second topographic map, on which the contour lines are formed with curved lines that are smoother than the contour lines of said first topographic map;

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revising and interpolating each irregular quadrilateral, produced from the basic

map and the map elements through said UTM drawing method, to form a right-

angled quadrilateral, thereby producing a third topographic map; and

displaying the third topographic map.


2. (Currently Amended) The method for producing a digital topographic map,

as described in claim 1, wherein the digital data is stored with map element data in a

recording means, and those data are displayed on a display meansas a single or

multi-layer structure, or outputted on a paper as a the topographic map.


3. (Previously Presented) The method for producing a digital topographic

map, as described in claim 1 or 2, wherein a checking function is provided for

checking whether the smoothing process is conducted appropriately or not, so that

the line segments cross with each other when producing said first topographic map

by connecting small sectors having the same elevation level, sequentially.


4. (Canceled).


5. (Currently Amended) The method for producing a digital topographic map,

as described in claim 4, wherein user map elements, which are produced

independently by a user, are stored in said recording means as a database, and the

user map elements and said third topographic map are displayed on said display

means as a single or multi-layer structure, or outputted on a paper as a the digital

topographic map.


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6. (Currently Amended) A method for producing a digital topographic map, comprising the steps of:

dividing a basic map, produced through a UTM drawing method, into irregular grid-like sectors at a predetermined distance;

further dividing each irregular grid-like sector obtained to thereby produce irregular small sectors;

Interpolating discontinuous data between each irregular grid-like sector and between each of the irregular small sectors;

producing digital data by using an algorithm to relate x,y coordinates of the irregular small sectors to an elevation level obtained through measurementfrom the UTM drawing method;

connecting the irregular small sectors at a common elevation with a straight line, thereby producing a first topographic map, on which contour lines are formed with line segments;

conducting a smoothing process on the contour lines of said first topographic map to produce a second topographic map, on which the contour lines are formed with curved lines that are smoother than the contour lines of said first topographic map;

revising and interpolating an each irregular quadrilateral, produced from the basic map and the map elements through said UTM drawing method, to form a right-angled quadrilateral, thereby producing a third topographic map from said second topographic map;

storing digital data for producing said third topographic map in a recording means, together with map element data;

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displaying the <u>third topographic map together with the map element</u> data on a

display means as a single or multi-layer structure, or outputting the <u>third topographic</u>

<u>map together with the map element</u> data on a paper ~~as a topographic map~~.

7. (Previously Presented) The method for producing a digital topographic

map, as described in Claim 6, wherein upon displaying the third topographic map on

said display means a color scale, which is divided by colors depending upon the

elevation levels, is also displayed, the color scale including a dialog having a slide

bar which is freely movable along said color scale, whereby said third topographic

map can be colored by an arbitrary color for each of the elevation levels by moving

said slide bar along said color scale.

8. (Previously Presented) The method for producing a digital topographic

map, as described in Claim 6, wherein upon displaying said third topographic map

on said display means an elevation level column is also displayed for indicating the

elevation of an arbitrary contour line, and wherein a dialog having a color palette is

also displayed for designating a color of the contour line to be colored, whereby the

contour lines of said third topographic map can be colored with an arbitrary color for

each of the elevation levels thereof by inputting the elevation of the contour line to be

colored into said elevation level display column and a color through said color pallet.

9. (Currently Amended) The method for producing a digital topographic map,

as described in any one of Claims 6 to 8, wherein a sub-screen is displayed on said

display means~~where~~ said third topographic map is displayed, and on said sub-

screen are displayed a fourth topographic map on a periphery continuous with the

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third topographic map of an arbitrary place that is displayed on said display means, by one of a map number, and/or a map name, or both a map number and a map name.

10. (Previously Presented) The method for producing a digital topographic map, as described in Claim 6, wherein said third topographic map is displayed on said display means together with an X-axis cursor and a Y-axis cursor intersecting in a cross, whereby latitude and altitude of said intersecting point are displayed in a portion of said display means by moving said X-axis and said Y-axis cursors .

11. (Previously Presented) The method for producing a digital topographic map, as described in Claim 6, wherein points are set up in plural numbers on said third topographic map and connected by a straight line or a smoothly curved line, whereby a cross-section of said third topographic mapcut by said straight line or said curved lineis displayed in a part of said display means.

12. (Previously Presented) The method for producing a digital topographic map, as described in Claim 6, wherein two (2) arbitrary points are set up on a contour line having the same elevation level on said third topographic map intersect a river, and those two (2) points are connected with a straight line, whereby a cross-section of the river cut by said straight line is displayed in a part of said display means, and out pondage in an upstream side thereof is also calculated.

13. (Previously Presented) The method for producing a digital topographic map, as described in Claim 6, wherein two (2) arbitrary points are set up on a

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contour line, having the same elevation level, surrounding a lake or a swamp on said

third topographic map intersect the lake or the swamp, and those two (2) points are

connected with a straight line, whereby a cross-section of the lake or the swamp cut

by said straight line is displayed in a part of said display means, and out pondage of

said lake or the swamp is also calculated.

14. (Currently Amended) The method for producing a digital topographic map,

as described in Claim 6, wherein upon displaying said third topographic map on said

display means, an arrow is displayed to indicate <u>one of</u> a direction, ~~and/or~~ a

magnitude, or both the direction and magnitude of an inclination of land.

15. (Currently Amended) An apparatus for producing a digital topographic

map, comprising:

a means for dividing a basic map, produced through a UTM drawing method,

into <u>irregular</u> grid-like sectors at a predetermined distance, and further dividing each

<u>irregular grid-like</u> sector obtained into <u>irregular</u> small sectors while interpolating

discontinuous data between each <u>irregular grid-like</u> sector and each of the <u>irregular</u>

small sectors, and reading elevation levels from digital data of the digital topographic

map, so as to be aligned on a plane ~~to be blocked~~, thereby producing mesh-like

data, and further storing the data as vector data therein;

a means for producing a first topographic map by reading out the vector data

for each of the <u>irregular</u> small sectors stored in said storing means, so as to connect

each <u>irregular</u> small sector with a straight line while selecting a measurement point in

a vicinity thereof when the elevation is the same judging from data defining tolerance

on the elevation level, without intersection on those line segments with each other;

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a means for producing a second topographic map, by conducting a smoothing process upon curved lines, passing through a contact point of the line segments of said first topographic map , and having continuous differential coefficients, thereby producing the second topographic map, on which the contour lines are made up with a group of curved lines;

a means for producing a third topographic map from said second topographic map, by revising and interpolating an irregular quadrilateral, which is produced upon basis of said basic map produced through the UTM drawing method, and also map elements, into a right-angled quadrilateral;

a recording means for storing therein said digital data for producing said third topographic map, together with map element data; and

a display means for displaying the digital data stored within said recording means into a single or multi-layer structure.

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